

Strategies for the assessment of tuberculosis contacts: An integrative literature review

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Received: 19 Apr 2022,

Received in revised form: 11 May 2022,

Accepted: 17 May 2022,

Available online: 24 May 2022

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Keywords— *Communicable Disease Control, Tuberculosis, Health Care, Outcome and Process Assessment.*

Abstract— *Objective: to describe, based on a literature review, the strategies used to assess the contacts of tuberculosis patients. Methodology: This is an exploratory and qualitative study, based on an Integrative Literature Review (RIL), composed of 6 stages. Applying the appropriate filters, resulted in 540 articles, in which 14 were selected using the exclusion criteria properly, in which materials that portrayed and explored the evaluation of tuberculosis contacts, latent tuberculosis, as well as the challenges in implementation were prioritized. of actions for this disease. Results: categorized into the following topics: Knowledge of contacts about what the disease is, care and transmission; The importance of contact tracing and Role of health professionals on tuberculosis transmission. Conclusion: the importance of evaluating tuberculosis contacts with the objective of controlling the disease was highlighted. In this way, it is important to emphasize that the health professional has a huge responsibility towards this public, and to the community in general, and it is necessary to always be seeking new knowledge in order to improve their health practices and ensure that their professional attitudes towards contacts make it possible to optimize identification and investigation of TB contacts.*

I. INTRODUCTION

Infectious-contagious disease is an infectious disease mainly caused by the tuberculosis virus, which mainly affects the lungs, but can reach the organs of the organs and even the pandemic (COVID-19), among the main causes of

death, the single infectious agent throughout the world. world, in addition to being the leading cause of death among people living with HIV ((TEIXEIRA, SAMICO, MARTINS, 2020; SILVA, MELO, MIGLIORI, 2020; WHO, 2021).

A quarter of the world's population is infected with *M. tuberculosis*, and in 2020, about 9.9 million people became ill with TB in the world, and in Brazil, in 2020, 66,819 new TB cases were reported, which corresponded to one case incidence rate of 31.6 cases/100 thousand inhabitants (Brazil, 2019; WHO, 2021; Silva, Melo, Migliori, 2020). The northern region of the country, in 2020, had the highest TB incidence coefficient, with 43.0/100,000 inhabitants, remaining above the national average. , et al, 2021; BRASIL, 2021).

Ananindeua-PA, municipality of Ananindeua-PA, it was observed that one of the problems for the surveillance and care of TB, consequently, is related to the shame and fear of revealing the family, which contributes to the worsening of the health status. of the individual, as well as for transmission of the pathogen to their family members. In addition, studies indicate that in home visits presented by nurses, other problems are directed to the conditions of the population, in which they live in unsanitary conditions, where, in most windows of entire houses, there is only one to ventilate the entire house (BRITO, this form 2020).

Ministry of Health (MS) recommends 100% of contacts who identified the treatment of Latent Tuberculosis Infection LTBI with the intention of reducing the risk of illness. The proportion of 20.9% in the northern region of the country (Brazil, 2019; Teixeira, Sa, Martins, et al, 60.9% in the northern region of the country) 2020; Brazil, 2021).

Among the actions proposed by the National Tuberculosis Control Program (PCNT) is the evaluation of patient contacts, as well as among the strategies of the Plan for the End of Tuberculosis is to intensify the evaluation of contacts. It is known that contacts are all people who live in the same environment as the index TB case, however the degree of exposure will depend on the disease, environment and exposure time (SOARES, COELHO, MONTEIRO, 2016).

According to Teixeira, Samico, Martins, et al, 2020, there are two types of contact with tuberculosis patients: home contact, used to define the contacts of TB patients who live with the index case in the same household; and the close contact, used to define the close contacts of the index case, including relatives who do not live in the same house, colleagues from work, leisure activities and other types of contacts. Therefore, the evaluation of these contacts becomes an indispensable strategy in TB programs, since the investigation of TB in contacts of bacilliferous patients is one of the simplest and most mandatory TB control actions to control the emergence of new cases, mainly in these more susceptible patients.

It is pointed out that living with a bacillary TB patient, the susceptibility of the exposed person and the intensity of

contact are factors that contribute to TB illness. According to the Ministry of Health (2019) 3.5% to 5.5% of family members or close contacts of a person with TB had previously undiagnosed disease. It is understood that people in the same household share the same socioeconomic conditions and, often, the same life habits, in which they contribute to illness from the disease, thus, the evaluation of contacts is essential for early diagnosis, as well as to reduce disease transmission.

In this context, the adequate assessment of the contacts of the person with TB represents an effective and low-cost way to detect the disease early, contributing to the interruption of the transmission chain and the propagation of microbial resistance. It is noteworthy that this assessment is a challenge for health services, due to the resistance of family members to attend the service and the lack of appreciation given to this procedure by professionals (LIMA, SCHWARTZ, CARDOZO GONZÁLES, et al, 2013).

According to Lima, Schwartz, Cardozo Gonzáles, et al (2013) evidence and strategies in the practice of evaluating contacts of people with TB, through the execution of evaluation protocols, monitoring of patients and their contacts must be carried out through the primary care, in view of the decentralization that the PNCT provides for this condition. In view of the above, the following guiding question was defined: What strategies are used to assess the contacts of tuberculosis patients based on scientific evidence in the period from 2011 to 2021?; The objective of the research is to describe, from a literature review, which strategies are used to assess the contacts of tuberculosis patients.

II. METHODOLOGY

This is an exploratory and qualitative study, based on an Integrative Literature Review (RIL), composed of 6 steps: 1) Establishment of a hypothesis or research question: What strategies are used for the evaluation of the contacts of the carrier of tuberculosis based on scientific evidence from 2011 to 2021; 2) Sampling or literature search; 3) Categorization of studies; 4) Evaluation of the studies included in the review; 5) Interpretation of results; 6) Synthesis of knowledge or presentation of the review (MARCONI, LAKATOS, 2017).

According to Silva and Fossá (2015) bibliographic research is one of the best ways to start a study, as it seeks similarities and differences between the articles found in the reference bases, thus contributing to a deeper understanding of the topic already investigated. The objective of this review method is to point out knowledge gaps that need to be filled and the need to carry out new studies.

To carry out the research, the following databases were used, Virtual Health Library (VHL), Latin American and Caribbean Literature on Health Sciences (LILACS), Medical Literature Analysis and Retrieval System (MEDLINE) and Database of Bibliographic Specialized in the area of Nursing (BDENF). The descriptors based on the Population, Intervention, Context and Time (PICot) methodology were: Tuberculosis; Prevention and Control; Latent Tuberculosis. The descriptors were searched by crossing them with the Boolean operator connector AND in the descriptors field in the Virtual Health Library to build the search strings.

Inclusion criteria are complete online texts in Portuguese, English and Spanish; articles published from 2011 to 2021, whose publications were in the databases; used the descriptors proposed for the scientific search. And as exclusion criteria, articles that were repeated in the databases and outside the period of literature review were adopted.

After the electronic search, we used the PRISMA flowchart, which serves as a supporting document explaining and elaborating how it was produced following the style used in other guidelines. (Figure 1). And the pre-selection was carried out, with a thorough reading of the titles and abstracts of the articles, with the intention that they comply with the established inclusion criteria. Thus, at first, 540 articles were pre-selected. These articles were analyzed using an instrument adapted from URSI (2005).

The instrument was presented, in which it is composed of several axes of methodological evaluation, however, it was adapted for this research, with two axes and their respective subdivisions, the first: Axis 1 Profile of productions, Axis 2 Results in evidence.

For content data analysis proposed by Bardin, which encompasses 3 phases: 1) pre-analysis, which is the organization of the preconceived idea and establishes

direction for the interpretation of collected information; 2) Exploration of the material, where it categorizes information from texts, interviews, allocating, for example, in paragraphs according to related topics and 3) Treatment of results, inference and interpretation, consisting of interpreting and mastering all the content collected (BARDIN, 2016).

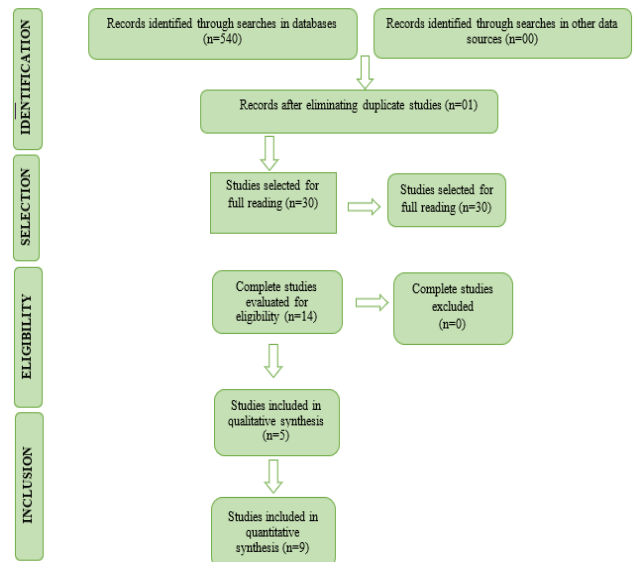


Fig.1: Flowchart on the study selection procedure, identification and eligibility for analysis. Belém-PA, Brazil, 2021.

III. RESULTS AND DISCUSSIONS

As shown in Table 1, 14 articles were selected, predominantly in English (92.85%), with quantitative, qualitative, observational, systematic, analytical, cohort and descriptive methods; published in the period from 2020 to 2014, no articles from the year 2021 were found with the descriptors used; in national and international journals and mostly indexed in Medline.

Table 1. Identification of articles selected for analysis, by title, year, place of study and main results. Belém (PA), Brazil, 2021.

| Title | Year/Author | Year/Author | Main results |
|---|--------------------------|----------------------------------|---|
| Tuberculosis: knowledge and adherence to prophylactic measures in contact individuals in the city of Recife, Pernambuco, Brazil | TEIXEIRA AQ et al (2020) | Quantitative, descriptive/LILACS | In this study, it was found that tuberculosis contacts have little or no knowledge about the disease, low adherence to primary health care and the active search for contacts is still inefficient. It was also analyzed that some of the TB contacts are unaware of the form of transmission of tuberculosis and |

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|---|------------------------|---------------------------------------|---|
| | | | the need to be evaluated and to carry out the requested tests. |
| MDR/XDR-TB management of patients and contacts: Challenges facing the new decade. The 2020 clinical up date by the Global Tuberculosis Network | MIGLIORIA et al (2020) | Non-systematic literature/MEDLINE | This study talks about the importance of eliminating the challenges in the fight against tuberculosis, especially in cases of multidrug-resistant tuberculosis. The review also comprehensively describes the latest information on contact tracing and management of LTBI in MDR-TB contacts, while providing guidance on post-treatment functional assessment and rehabilitation of TB sequelae, infections and other public health priorities. |
| Is the EU model for contact investigation applicable to high TB burden settings? | ZELLWEGER JP (2020). | Quantitative/MEDLINE | This study shows that it is possible and important to carry out contact investigation of patients with a transmissible form of tuberculosis. Early diagnosis allows for a shorter treatment, preventing the transmission of the disease. Implementation of preventive therapy for people at higher risk of developing TB in the future, that is, reducing the pool of future TB cases. |
| Knowledge, attitudes and practices on tuberculosis transmission and prevention among auxiliary healthcare professionals in three Brazilian high-burden cities: a cross-sectional survey | TRAJMAN et al, (2019). | Cross-sectional, quantitative/MEDLINE | A study showed that knowledge among auxiliary health professionals about the transmission and prevention of tuberculosis presents relevant gaps. These knowledge gaps were notably related to the management of LTBI, including how to recognize it and prevent progression to active tuberculosis through treatment. |
| Acceptance of Chemo-prophylaxis for Latent Tuberculosis Infection among High School/College Student Contacts of Tuberculosis Patients in Shanghai, China | LI Yang et al, (2018). | Cross-sectional study/MEDLINE | The present study aims to evaluate the contacts of students with tuberculosis and the level of knowledge about TB and their availability to participate in LTBI chemoprophylaxis. |

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|--|-------------------------------------|---|---|
| Close contact interferon-gamma response to the new PstS1(285–374): CPF10: a preliminary 1-year follow-up study | ARAÚJO LS et al, (2017). | Analytical Study/MEDLINE | This study aimed to perform a one-year follow-up on recruits in the city of Rio de Janeiro, and as a result, they obtained low IFN-g reactivity to all antigen stimuli during the entire follow-up period, except for one participant. |
| Knowledge about tuberculosis transmission and prevention and perceptions of health service utilization among index cases and contacts in Brazil: Understanding losses in the latent tuberculosis cascade of care | SALAMEL FM et al, (2017). | Observational cross-sectional study/MEDLINE | The present study excelled in unraveling what is called the cascade of contacts and what are the steps for losses to occur, as well as evaluating the degree of knowledge of these contacts about care and transmission. |
| Improving tuberculosis contact tracing: the role of evaluations in the home and workplace | DUARTE R; NETO M; BARROS H, (2012). | Analytical comparative study/MEDLINE | The present study highlights the importance of tracing TB contacts, and people who have recently acquired the disease, in order to eliminate the disease. They perform a comparison of screening data that reveal that there is a greater decrease in severe cases if there is early screening. |
| Tuberculosis clinical units improve contacttracing | BRUGUERAS et al, (2016). | Observational Study/MEDLINE | This study evaluates the impact of the clinical picture of tuberculosis in units that trace TB contacts. Where it was observed that the creation of clinical units managed to track a greater number of contacts and significantly increased the number of adherence to treatment. Therefore, they concluded that there was an organizational advance in this screening, and adherence to early treatment of TB contacts. |
| Tuberculosis Contact Investigations United States, 2003-2012. | KAI H YOUNG, et al (2016) | Observational cross-sectional study/MEDLINE | This study evaluates improving contact investigation activities to ensure completion of treatment for contacts recently infected with <i>M. tuberculosis</i> , which is essential to achieve the goal of eliminating TB. |

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| Risk Assessment of Tuberculosis in Contacts by IFN- γ Release Assays. A Tuberculosis Network European Trials Group Study. | JEAN-PIERRE ZELLWEGER et al (2015) | Descriptive cross-sectional study/MEDLINE | The present study analyzes the results of the IGRA and the effect of preventive chemotherapy on tuberculosis progression rates in recent contacts. |
| Age-specific risks of tuberculosis infection from household and Community exposures and opportunities for interventions in a high-burden setting | JONATHAN L. ZELNER et al. (2014) | Analytical study/MEDLINE | This study presents a new approach to estimating age-specific infection risks (ROI) from household and community sources in Lima, Peru. |
| Yield of tuberculosis contact investigations in Amsterdam: opportunities for improvement. | ROSA SLOOT et al (2014) | Observational study/MEDLINE | The present study determines contact investigation coverage and throughput, assesses compliance with guidelines, and identifies opportunities for improvement. |
| Risk for tuberculosis in child contacts. Development and validation of a predictive score. | PEI-CHUN CHAN et al (2014) | Cohort Study/MEDLINE | This study aims to develop and validate a simple and easy-to-use predictive score for TB risk using data routinely available during contact investigation. |

The literature review revealed that it is possible to formulate three categories from relevant points of view. Thus, the following categories were developed: Knowledge of contacts about what the disease is, care and transmission; The importance of contact tracing; Role of health professionals on tuberculosis transmission.

Category 1: Knowledge of TB contacts about the disease, care and transmission.

Tuberculosis, the second (after COVID-19) deadliest infectious killer, is caused by a bacterium called *Mycobacterium tuberculosis* and most often affects the lungs and can be transmitted through coughing, talking and sneezing by the infected person, or that is, those who have a bacillus in their saliva (PAHO, 2021).

The pulmonary form, in addition to being more frequent, is also the most relevant for public health, especially the positive one on smear microscopy, as it is primarily responsible for maintaining the disease transmission chain. It is emphasized that the extrapulmonary form, which affects other organs, occurs more frequently in people living

with the Human Immunodeficiency Virus (HIV), especially among those with immune compromise (CARVALHO, PONCE, SILVA-SOBRINHO et al, 2018).

According to Brasil (2019) the main way to control tuberculosis is the diagnosis and immediate start of treatment, because when starting treatment, transmission tends to decrease gradually and, in general, after fifteen days of treatment, it is very reduced, allowing the chain of transmission of the disease to be broken. However, the MS recommends that control measures be implemented until the smear test is negative, such as covering the mouth with the arm or tissue when coughing and keeping the environment well ventilated, with plenty of natural light, as the bacillus is sensitive to light. sunlight and air circulation allows the dispersion of infectious particles. Therefore, ventilated environments and direct natural light have been shown to reduce the risk of transmission.

In general, the contacts of TB cases report that they know that the disease is serious, that it has a cure and treatment, however, they are unaware of the form of

transmission and the symptoms, which shows that knowledge about TB is insufficient, even if there is someone in the family with the disease. Thus, information about TB becomes indispensable for the recovery of knowledge about the health-disease process in order to reduce social issues and demystify the disease. It can even influence the most common consultations and attitudes of contacts of TB patients and the investigation of obstacles that distance them from prophylactics (TOURINHO, OLIVEIRA, SILVA AL, 2020).

The research by Tourinho, Oliveira, Silva et al (2020) also points out that TB contacts are unaware of the way TB is transmitted, and the need to disseminate and carry out the requested medicines because they are inserted in inequities, often, possibly empowering them. the possible problems, more conscious for the early detection of cases, as well as for the disease, in the process and reduction of the incidence of the disease by in the transmission of the transmission of the early disease.

Linked to the fact of having knowledge about the community, it can impact the results and support the control of the disease, considering that the actions and references to the grievance refer to the power held by society and early identification of the signs and symptoms of tuberculosis, as well as the power of attorney for health services to carry out disease prevention. Society becomes an ally in the awareness process and also needs to be aware of and access to public health services. Thus, health education and guidelines on tuberculosis prevention are essential to achieve disease control objectives and strategies (CARVALHO, PONCE, SILVA-SOBRINHO et al, 2018).

Category 2: The importance of contact tracing.

TB cases initially identified as new or recurrent, in a person of any age, in a specific household, are considered an index case. The importance of rapid diagnosis and early treatment of the index case is perceived, and this should be investigated to identify the people who will be considered contacts, that is, those who have contact with the case (SILVA, LIMA, SANTOS et al, 2018; SILVA et al, 2021).

In this way, information about contacts and the type of relationship established should be listed and, whenever possible, home visits should be carried out to better understand the circumstances and invite them to come to the Health Unit to be evaluated and, if necessary, request tests such as chest radiography, smear and tuberculin skin test (PT) with PPD (Purified Protein Derivative) or Interferon-Gamma Release Assays (IGRA) (TEIXEIRA, et al, 2020).

It should be noted that for the control of tuberculosis, it is essential to interrupt the chain of transmission of the disease, since each person with undiagnosed pulmonary TB tends to infect 10 to 15 people/year, and of these, one to two

become ill, maintaining transmission and disease at an endemic level (GUIMARÃES, 2017).

It is confirmed that the individual with Active Pulmonary Tuberculosis, when coughing, sneezing or talking, releases droplets (Pflüger droplets) that transport the bacilli to the environment, the smaller these droplets (Wells nuclei), the longer they remain in the air, and, therefore, the greater the possibility that they are aspirated, inhaled and infect other people (SILVA, et al, 2018).

Although TB is a curable disease, available free of charge in the Unified Health System (SUS), Brazil is among the 30 countries with the highest TB burden in the world, due to the unstructured health system, restricting access to health services. population, unplanned urbanization, unhealthy practices and environments. Since 2010, the PNCT has recommended that tuberculosis contacts be monitored. Controlling the contacts of TB cases is a strategy for preventing future illness (SILVA, et al, 2018; FIGUEIREDO JÚNIOR, SÁ, 2019).

Contacts who are no longer monitored and/or evaluated represent an important factor for the maintenance of TB, as they are more susceptible to developing the active disease in the future, perpetuating the disease transmission chain (FIGUEIREDO JÚNIOR, SÁ, 2019; MENDES, 2018).

In this way, the contacts of the TB index case must be examined for the symptoms of the disease and/or the Tuberculin Test (PT) should be performed, this test evaluates the cellular immune response in vivo against the antigenic extract of *Mycobacterium tuberculosis*; and/or IGRA, an exam being implemented in the SUS, which also evaluates the cellular immune response, albeit in vitro. For those with TB symptoms, specific tests such as sputum smear, rapid molecular test (MRT) or culture should be performed; users who are asymptomatic should perform PT and chest X-ray. Those who are asymptomatic, PT or IGRA positive and without signs of active TB on chest radiograph, treatment for Latent Tuberculosis Infection (LTBI) is recommended (CASELA, 2020; SILVA, et al, 2018; BRAZIL, 2019).

Individuals who live with TB carriers have a high risk of infection and disease progression, especially when this interaction is intense and/or continuous (MENDES, 2018). According to the study by Figueiredo Júnior and Sá (2019), who evaluated 1000 medical records of TB contacts, the most frequent type of interaction between contacts and patients with active TB was continuous (n = 915), in addition to representing the largest positive PT frequency (52.80%), with the "Father/Mother" group presenting the highest frequency of positive PT with 64.90%, followed by the "Spouse (a)" group with a positive PT frequency of 57.40%.

Given the above, screening for Latent Tuberculosis Infection (LTBI) is recommended for all contacts of infected patients, regardless of age or comorbidity. LTBI is the period between the first contact with the bacillus and the development of active TB, that is, the individual is infected by the TB bacillus, but without manifestation of the active disease. The detection of LTBI for the World Health Organization (WHO) means a strategy for the control of TB, as the detection of latent infection allows the initiation of drug treatment, preventing progression to active disease (SILVA et al, 2021; FIGUEIREDO JÚNIOR, SA, 2019).

According to Dantas et al (2018), the vast majority of TB contacts identified with LTBI were never investigated, and there are losses that occur mainly in the first stages, which are: identification and investigation. It was noticed that there are many reports of active TB cases, but they could be avoided in Brazil if all contacts were investigated. It also states that the contacts would like to have been investigated and would undergo treatment for LTBI if prescribed, which represents, in this case, a missed opportunity.

It is understood the question of why, that there are few contacts investigated in Brazil, one of the main reasons is the lack of close relations between the health team and the patient, with this it is necessary to train health professionals about their attitudes. and health practices together with the TB patient (DANTAS et al, 2018).

Category 3: Role of health professionals on tuberculosis transmission.

TB has a prevention method, through the treatment of LTBI that is available in the SUS and which makes most deaths from the disease avoidable. According to Trajman et al (2019), a quarter of the world population has LTBI, which constitutes a reservoir for new TB cases and that contact tracing of index TB cases is an important task of Primary Health Care services (APS).

Less than 10% of people who need treatment for LTBI received the proper diagnosis, as obstacles to accessing health care, attitudes, practices on TB transmission/prevention, knowledge and beliefs are among the possible explanations for losses in the cascade. of contact care. This fact makes it difficult to adequately control the disease (TRAJMAN et al, 2019).

To date, there is no exam considered the gold standard for the diagnosis of LTBI, which is based not only on the result of a diagnostic test, but also on the exclusion of the active form of the disease, as well as, the PT has limitations such as the need of return of the patient to the health establishment to carry out the reading, low sensitivity, especially in immunocompromised individuals, low specificity, due to the possibility of a false positive result in

populations that have broad vaccination coverage with BCG, as well as cross-reaction with atypical mycobacteria (SILVA et al, 2020; CASTILE, 2020).

Thus, the role of PHC is highlighted, considered the main gateway to health services in Brazil, and decentralizing the PNCT's health actions to it. The Family Health Strategy (ESF) covers two-thirds of the Brazilian population and is the largest public health system in the world. It is noteworthy that ESF coverage has significant results that are associated with successful treatment of active TB. It is emphasized that the ESF, the Community Health Agents (ACS), are auxiliary workers who live in the community and are trained for health tasks and responsible for home visits, being able to detect those individuals with respiratory symptoms, observe and directly administer the treatment of TB and convening the presence of TB contacts for evaluation in the FHS (GUIMARÃES, 2017).

The increase in FHS coverage and the development of actions for active search, control and treatment of TB, combined with improvements in the laboratory network and the implementation of rapid diagnostic methods, it is possible to visualize a favorable scenario for the improvement of the current epidemiological situation of the disease. (GUIMARÃES, 2017).

Health teams, with the support of auxiliary workers, have a very important role with the patient for the control of TB in Brazil, because by adopting the necessary measures, they create a bond and increase the probability of cure. It is stated that the nurse must be a professional qualified for TB control actions, in order to identify clinical, epidemiological and social information of the disease suspects and take steps to clarify the diagnosis (GUIMARÃES, 2017).

IV. CONCLUSION

The evaluation of tuberculosis contacts is an important strategy for the control of TB, because through it, it is possible to prevent new cases of active TB from happening, controlling and breaking the chain of transmission of the disease, being used for this purpose the investigation of symptomatic patients. respiratory diseases, the performance and evaluation of PT and/or IGRA and the treatment of LTBI, as the main form of prevention of active TB.

It is noteworthy that the contacts who have contact with the TB case are more susceptible to infection by the bacillus, so it is imperative to perform the LTBI screening and start preventive treatment, but there are still some barriers to the implementation of this strategy such as the difficulty in diagnosing LTBI, the awareness of the population to take the contacts in the health services for the evaluation of the contacts, as well as the feedback in the reading of the PT.

Thus, there is a need to carry out health education actions with professionals to answer questions, explain about the disease and the main forms of prevention, raise awareness of the importance of evaluating contacts and train for the application and reading of the tuberculin skin test and initiation of LTBI treatment. It is considered that the health professional has a huge responsibility to this public, and to the community in general, and it is necessary to always be seeking new knowledge in order to improve their health practices and ensure that their professional attitudes towards contacts make it possible to optimize identification and investigation of TB contacts.

It is also imperative to empower the community with knowledge about TB and the forms and strategies of disease control so that they work together with health professionals in the actions of investigation of cases of the disease and in the evaluation of contacts, looking for the service and professionals of health for the specific exams.

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